DOCUMENT RESUME

ED 044 538 AA 000 640

AUTHOR Pan, Elizabeth
TITLE Library Serials Control Systems: A Literature Review and Bibliography.
INSTITUTION ERIC Clearinghouse on Library and Information Sciences, Washington, D.C.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Bureau of Research.
PUB DATE Dec 70
NOTE 49p.

EDRS PRICE EDRS Price MF-$0.25 HC-$2.55
DESCRIPTORS *Automation, Bibliographies, Costs, *Electronic Data Processing, Library Standards, Library Technical Processes, Literature Reviews, *Serials, Standards, *Systems Analysis, *Use Studies
IDENTIFIERS *Library Automation

ABSTRACT

The literature on automated serials control systems and related subjects is reviewed and conclusions are drawn on the issues raised. As much as possible the data reported in the literature are verified. A selected bibliography of documents published prior to the data of this report is prepared. In addition to descriptions of the major serials systems, topics of concern include user studies, technological developments, emerging national standards and costs. (Author)

LIBRARY SERIALS CONTROL SYSTEMS: A LITERATURE REVIEW AND BIBLIOGRAPHY

Elizabeth Pan
Serials Control Project Coordinator
Five Associated University Libraries
Syracuse, New York

December 1970

ERIC Clearinghouse on Library and Information Sciences
American Society for Information Science
Washington, D.C.

This publication was prepared pursuant to a contract with the Office of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official Office of Education position or policy.

CONTENTS

Abstract

The literature on automated serials control systems and related subjects is reviewed and conclusions are drawn on the issues raised. As much as possible the data reported in the literature are verified. A selected bibliography of documents published prior to the date of this report is prepared. In addition to descriptions of the major serials systems, topics of concern include user studies, technological developments, emerging national standards and costs.

1.1 INTRODUCTION

The Five Associated University Libraries (FAUL) is commissioned by three out of its five member libraries, namely, Cornell University, the State University of New York at Buffalo and the University of Rochester, to design and implement a joint serial control system in four phases. Phase I is a feasibility study; Phase II is the system design and Phase III is a pilot implementation of the system designed in Phase II; Phase IV is the operating system itself.

The objective of Phase I is to identify feasible alternative system configurations and provide a basis for their evaluation so as to enable the contract libraries to select the most workable configuration for intensive design in Phase II. The alternatives must take into consideration three major factors: (1) requirements of the contract libraries, (2) implications of state and national standards, and (3) the state-of-the-art of automated library applications, in general, and serials control systems, in particular.

The SUNY Biomedical Communication Network, located at the Upstate Medical Center in Syracuse, N.Y., has been contracted to perform the work defined for Phase I. Mr. Ronald Miller, Coordinator of Library Systems for FAUL, is the Principal Investigator for Phase I.

The first task defined for the feasibility study is to review the relevant literature on the subject of automated library serials control systems. Specifically the major objectives of the task are:

- To identify planned and operating automated library serials control systems reported in the literature prior to the date of this report. The major product of this effort is a list of institutions which have operational or planned serials control systems which are the most likely candidates for further study by the investigating team.

- To identify published works on research related to problems inherent in an on-line serials control system and other relevant background information.

- To draw appropriate conclusions on issues raised in the literature, to note the most common problems met in the design and implementation of serials control systems, and to report on the discernible trends in library automation efforts.

It is felt that the objectives of the literature review are broad enough to be of interest to other libraries embarking on a similar project. Portions of the report dealing with library automation in general may be of interest to those who wish to keep up with current developments and trends. It should be noted, however,

that the bibliography is selective rather than comprehensive. The selectivity is based on the criteria defined in the scope of the literature review (see below). As much as possible, the data reported in the literature have been verified by contacting the appropriate personnel. A by-product of the verification process is a list of libraries with major serials control systems and related applications including addresses, names of project directors and their telephone numbers, if available (see page 17). Since the whole area of library automation is a highly volatile one and since resources do not permit the first hand verification of all the data, it would be most helpful if omissions and outdated information are brought to the attention of the author to permit the updating of this report for incorporation into the Final Report for Phase I of the FAUL Joint Serials Control Project.

1.2 SCOPE OF THE LITERATURE SEARCH

The degree of use of the computer in automated serials control systems can range from the production of lists of titles with holdings and location information, to the total control of serials. "Total" control implies that the bulk of the titles in the system are controlled with the aid of the computer. A "total" serials control system includes the following major applications:

- Pre-order verification to determine whether or not a title is in the system
- Ordering, including subscription renewals
- Fund accounting
- Check-in
- Holdings update
- Routing of copies
- Claiming notification
- Binding notification
- Listing
- Management statistics

Most of the operational systems fall somewhere between the two extremes of listing and total control. There is also variation in the degree of automation within specific applications. For example, the claiming function can be performed with the aid of a printout of expected arrivals; those titles not checked-in becoming candidates for claims. In more sophisticated systems,

claim notices for a significant portion of the titles are automatically produced. Another variation in the degree of automation is in the binding application. A system can issue notices when volumes are ready for binding or binding records can be printed automatically at the completion of a volume or set.

In general, serials control and related systems such as monograph acquisitions systems which encompass one or more of the major applications defined above are pertinent to the subject. However, for the purpose of inclusion of operational and planned systems in the list of candidate systems for further study, certain criteria are defined as a guide to their selection. The criteria are listed below.

- The size of the data base should be in the same order of magnitude of that of the combined holdings of the participating libraries (estimated 80,000-100,000 titles).
- The system should preferably operate on-line for file modification and display.
- Ideally, the system should operate in a remote access network environment with several institutions sharing a common data base and having equal and simultaneous access to it.
- Preference is given to a well-documented and fully operational systems instead of those systems which are briefly described or which appear to be closely patterned after a system which is already known.
- In addition, experimental systems (such as M.I.T.'s Project INTREX, for instance) using esoteric hardware and software are excluded from initial consideration.

It should be pointed out that these criteria are defined as guidelines to aid in the selection of systems for further study. It is not expected that these criteria be met fully for a system to qualify for consideration. There is, in fact, no operational system reported in the literature which can fully meet all the criteria defined.

A check list of the major sources of information is another way to define the scope of the search. The check list also serves as the basis of the organization of the bibliography in Part 2.1 and of the report on the findings of the search in Section 1.3.

- Bibliographies on library automation.
- Surveys of automation projects in U.S. and Canadian libraries.
- State-of-the-art type articles reviewing current developments up to a specified date.

- General and theoretical discussions on various aspects of on-line serials control systems.
- Studies on how periodical literature and the bibliographic tools related to it are used by library patrons.
- Reports on advances in technology particularly in computer input microfilm (CIM) and computer output microfilm (COM).
- Standards inherent in the National Serials Data File Program, MARC format for serials, and the Standard Serial Number (SSN).
- Descriptions or reports on the cost of manual and automated serials control systems or of a specific process, such as the conversion of printed or written records to machine readable form.
- Descriptions of serials control and related systems which fall within the scope of the study as defined in the previous section.
- Related research which is considered relevant to the design of a serials control system by the investigators, contractors, and consultants to the project.

1.3 FINDINGS OF THE LITERATURE SEARCH

1.31 Bibliographies, surveys and state-of-the-art reviews

A literature search commonly starts with the major indexes on the subject, in this case, LIBRARY LITERATURE, LIBRARY AND INFORMATION SCIENCE ABSTRACTS and INFORMATION SCIENCE ABSTRACTS (formerly DOCUMENTATION ABSTRACTS). In addition, RESEARCH IN EDUCATION is consulted to locate those works which may not be published in the professional journals.

The latter title includes reports generated by completed and ongoing research projects funded by the U.S. Office of Education and reports collected by the various Clearinghouses, especially the Clearinghouse on Library and Information Sciences located at the headquarters of the American Society for Information Science (ASIS).

Special bibliographies on library automation such as those by Mason [7], McCune [5] and Speer [13] are also found to be basic sources, as are the bibliographies published with state-of-the-art articles appearing in the ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY. A comprehensive compilation of these references is Neeland's A BIBLIOGRAPHY ON INFORMATION SCIENCE AND TECHNOLOGY [8].

Among the published surveys of library automation activities, three stand out: the LARC survey, the SLA/ALA/LTP survey, and that by Overmyer.

The LARC Survey, conducted in late 1969, covers the U.S. and Canada. Three thousand college, university, government, public and special libraries were polled with 300 returns [10]. For each institution, a brief description of the automation activities is given and the status of each project, i.e., operational or planned, is specified. The inclusion of the name and title of the coordinator of the automation activities is a most useful feature of this survey. Statistics on the survey are compiled by Markuson [6]. The author points out that while circulation systems are the most widely reported automation projects, the area of most intense activity appears to be in serials control. It is also observed that the most common application of serials control systems is the production of various types of paper lists, the most popular of which is serials holdings. Only one on-line serials control system is reported in the survey -- that of Laval University in Quebec, Canada.

The second major survey is sponsored jointly by the Special Libraries Association, American Library Association and the Library Technology Project. This survey is summarized and reviewed by Jackson [2, 3]. It is unfortunate that the survey itself has not been made more readily available.

The third, Overmyer's LIBRARY AUTOMATION: A CRITICAL REVIEW [11], includes a survey of automation activities in U.S. libraries of various types (except school libraries) and of library networks. Full descriptions of the 20 most advanced systems are given.

There are other surveys such as the series of surveys on automation in federal libraries sponsored by the U.S. Office of Education. It is felt, however, that the ones described above are the most significant ones for the purposes of this study.

1.32 Related research and background information

Reports on the findings of research related to bibliographic data systems, in general, and to serials control systems, in particular, are included in the bibliography primarily for future reference in the design phase of the project. No attempt is made to review them here.

As in most attempts at bibliographic classification there are some works which do not fit into any one category but which do shed some light on the problem. These works are best characterized as background information.

Background Information

Overmyer's LIBRARY AUTOMATION: A CRITICAL REVIEW [11], mentioned earlier as a survey of automation activities in selected libraries, also covers a wide range of related information including cooperative efforts, implications of automation, personnel, equipment,

costs, etc. Four factors are isolated in the review as contributing to the need for automation in libraries: (1) the increased volume of printed material, (2) limited resources in the face of increasing demands, (3) lack of professional and non-professional manpower, and (4) the changing role of the library and the extension of services. The author emphasizes the need for the continuing education of library personnel as an important implication of automation. She also notes some of the problems inherent in comparing the cost of manual with automated systems. As already noted, a section of the report deals with automation activities in library networks.

Olson [29] offers some interesting suggestions in the handling of serials. The author proposes that all open entries be handled as serials and that every title change be looked upon as a closed entry. The latter suggestion is in line with the Anglo-American cataloging rules which deal with the handling of title changes of serials. Note, however, that the Library of Congress, as well as other libraries, has decided to continue the practice of recataloging title changes under the current title with cross references from previous titles. The variations in practice of the choice of main entry, handling of title changes, and definition of serials are questions basic to any serials control system. These variations become even more significant if the system is to meet the requirements of more than one library.

Of particular interest to FAUL, and to other library groups who are attempting joint systems design and implementation, are the experiences of the participants of the Collaborative Library Systems Development Project (CLSD), namely, Columbia University, Stanford University and the University of Chicago. In a paper presented at CLSD Conference, November 9-10, 1970, in New York City, Fasana [20] summarized the problems which were met in attempting to produce compatible systems design. He classified these problems into four categories: logistical, technical, personnel, and administrative. Because of the physical distance between the participating libraries, the scheduling of meetings of personnel who carry heavy work loads is a major logistical exercise. In the area of technical problems, the major ones are terminology, documentation, systems design considerations, and individual project schedules. Differences in procedures sometimes cannot be resolved because of restrictions beyond the library's control, such as fiscal accounting. Hardware incompatibility also limits the area of commonality. The conclusion arrived at is that "it is technically infeasible at this point to attempt to develop compatible library programs. At best, what can be achieved is agreement and some degree of compatibility on a system design level."

It should be pointed out, however, that the CLSD Project has neither a central staff and facility nor a mandate to develop one system for more than one library. Other collaborative efforts such as the Iowa

State University Libraries, the Universities of Metropolitan Washington have started cooperative projects which will test the validity of the conclusion drawn from the CLSD experience.

McAllister [27] discusses the difference between the cataloging and display of bibliographic information in an on-line catalog and a card or printed catalog. The author suggests that in order to take advantage of the capabilities of an on-line catalog certain traditional ideas about cataloging and the display of bibliographic data would have to be abandoned. In a card catalog, the main entry or unit card is the repository of the complete bibliographic information. This concept provides an efficient mechanism for maintaining a card file. In an on-line catalog and some printed catalogs, all access points are linked to the master bibliographic record without the repetition of data. The elimination of main entries in the traditional sense of the word not only speeds up cataloging, but also makes the system more user-oriented. As a further service to the user, the on-line catalog can display the various forms of the access points in a manner similar to a KWIC index. The author makes the further point of noting that on-line catalog should combine the scanning and display facilities of a traditional catalog with the searching capabilities of a computer.

A characteristic of library machine systems is the large data base required. In almost every case study of a library system the problems and cost of record conversion are mentioned. Theoretically, the bibliographic record for a title should be keyboarded only once and then distributed in machine readable form. The MARC tapes from the Library of Congress are supposed to do this. It is found, however, that a standard format does not guarantee standard data which is accepted by the users. The experience of the University of Colorado in its attempt to use the serials data base of the University of Illinois reveals the problems encountered in using existing data bases [19]. The conclusion of the experiment is that it is less costly and time consuming to build a data base from scratch.

Other subjects of background interest, such as the King report on automation and the Library of Congress [24], are included in the Bibliography in Part 2.1.

User Studies

Librarians, in introspective moments, have criticized the library profession for not being able to adapt to the changing environment and for creating a system which is largely incomprehensible to users. Enough is not known about user needs and what is know is seldom implemented. Automation of library processes requires a closer look at how the library patron uses bibliographic tools.

Periodical literature is controlled by two major types of bibliographic tools: those generated by the library, such as card catalogs, book catalogs, and serials lists, and indexes, prepared by indexing and abstracting services such as Chemical Abstracts, Index Medicus, etc. The main difference between the two types of bibliographic tools is the bibliographic unit controlled by each. In library-generated tools, the unit is the periodical title; in indexes, the unit is the article, paper or report contained in a periodical.

The distinction between the two types of bibliographic tools has important implications which should be considered, the more so if automation of serials control is contemplated. The necessity for full bibliographic description of periodicals should be examined. The Lipetz [38] study on the use of the card catalog at the Yale University Library indicates that only 5% of the users approach the card catalog to do bibliographic searches (defined as using the information on the catalog card without any intention of locating or borrowing the document); 73% are document or known item searches; 16% are subject searches and 6% are author searches. These figures apply to the use of the card catalog regardless of the form of material sought, i.e., monographs, serials, or maps. The ratio between use of the card catalog for monographs and for periodicals is 8 to 1.

Peterson [39] reports specifically on the use of periodical literature at the University of Michigan. His findings indicate that 50% of the users had precise references before coming to the library; of the remaining half, 65% indentified precise references through indexes and abstracts before approaching the card catalog.

The conclusion which can be derived from the above studies is that a significant majority of users approach periodical literature with a specific reference to a document contained in a periodical. The card catalog or serials list, etc., is used to determine the ownership of the periodical title, the availability of the specific volume and issue, and its location. The conclusion raises serious questions about the value of a broad subject approach to periodical titles as provided in the card catalog and also suggests that classifying periodicals has limited advantages. Theoretically, shelving by call number permits the user to browse. The nature of periodicals requires broad classification, however, and changes in subject coverage as well as in classification schemes reduces the accuracy of subject arrangement on the shelves. In addition, bound volumes of periodicals may be in closed stacks in which case the browsing advantage is not used. Even with the assumption of browsing utility to the user, studies indicate that the user is primarily concerned with the physical address of a specific volume and issue of a periodical, and that the information he brings with him to the card catalog or shelves is the title of the periodical as cited in a reference, a footnote, a bibliography, or an index.

Another important conclusion arrived at in the Lipetz [38] study is that the card catalog can be made more useful by making it more comprehensible to the user and by making its expansion more timely, i.e., providing access to current materials more quickly, as opposed to providing more access points to the materials. Based on what is known about user habits vis-a-vis periodical literature, regardless of whether or not a library plans to automate its control, but more so if such plans exist, library administrators and librarians in general need to evaluate traditional practices in the bibliographic control of serials. The roles of the two major types of bibliographic tools should be examined for ways in which their services may complement each other. Factors such as the increase in publication rate, and cost of materials and processing, concurrent with decreasing budgets and increasing user population, require that the library address its efforts to those services which are in greatest demand. The present practice of cataloging periodicals may become a luxury few can afford.

Technology

This section on technology does not aim to be a comprehensive state-of-the-art report on the applications of technological developments to libraries. There are many publications dealing with aspects of this subject, some of which are listed in the bibliography. The main concern here is on the blend of microfilm and computer technologies. Libraries, with their large files, require inexpensive input and output methods and mass storage. In view of this requirement, the most promising developments are computer output microfilm (COM), computer input microfilm (CIM) and computer controlled retrieval (CCR).

The Avedon [42] survey of the COM field estimates that 1,000 COM units are presently in use mostly in the business scientific and graphic arts applications. Library systems, especially those operating in the batch mode and therefore requiring frequent and long listings, are looking at COM to reduce printing costs. CIM, although less advanced than COM, has potentially a greater impact on lowering costs. CIM converts convential alphanumerics and graphics stored on microfilm to machine language. The Teplitz [52] article provides a descriptive summary of the major CIM hardware.

CCR systems combine microform's storage and computer access. The Micro Interactive Retrieval System features a video terminal display and microfiche storage. Another variation is the DSI microsearch terminal which uses 35mm film cassettes. The computer responds to a keyboarded request by identifying the cassette and page number containing the information sought and displays the page after the cassette is mounted. Other systems are described in the Teplitz [52] article. The basic concept underlying CCR systems is to have the computer do what it does best -- that is, locate information and have the information stored outside the computer.

1.33 Standards for serials

The most notable recent development in the progress toward national standards for serials is the publication of the MARC format for serials [58]. Of significance, too, are the codes used for languages and publishers which were also developed by the Information Systems Office of the Library of Congress.

Adams' paper [54] on the progress toward a national serials data system looks at computer application to serials control from the point of view of identifying and locating serial titles. He observes the trend from individual library applications to statewide and regional networks and finally to the beginnings of a national system. Adams also describes three developing systems handling science and technology data bases. The first system, Chemical Abstracts Service's ACCESS (now known as CHEMICAL ABSTRACTS SERVICE SOURCE INDEX), operates on a machine-readable data of approximately 40,000 entries, 9,000 of which are cross references and 15,000 are currently published serials. There are 1,700 subscribers to the hard-copy version of ACCESS and 1,400 subscribers to the up-date service. At the moment, there are no subscribers to the ACCESS tapes but a software house in Philadelphia, 3i Company/Information Interscience, Inc., is presumably building software around this data base to sell as a tandem service to subscribers of the ACCESS tapes.

The second system was developed by the Medical Library Center of New York and is called the Union Catalog of Medical Periodicals (UCMP). The UCMP has a data base of 33,000 titles in medical and related subject areas. The UCMP software and data base have been widely used by other libraries to produce their own listings. Both of these systems manipulate a relatively small number of bibliographic data elements, are limited to a relatively narrow subject scope, and, at present, are used exclusively to produce lists.

The third national system of promise is the National Serials Data File Program undertaken by the three national libraries. The major goal of the program is to develop "a national data bank of machine readable information on all serial publications" [59]. The first phase of the project has been completed and has resulted in the publication of the preliminary edition of the MARC format for serials. Two major activities are in progress as part of the Phase II. The first, is a pilot project to convert the UNION LIST OF SCIENTIFIC SERIALS IN CANADIAN LIBRARIES to MARC format. The Association of Research Libraries has been contracted to provide project leadership and staff for this effort. The second is the development of the Standard Serial Number (SSN).

There is unanimous agreement that unique and standard identification of serial publications is necessary for their control. The lack of a standard identification is felt more acutely in view of the trend towards the use of computers in the control of serials. The criteria

which must be met by such a standard identification number have been defined [55]. It is recommended that, once developed, the Library of Congress should have the continuing responsibility of maintaining the code.

As an initial step in the development of a standard serial number, existing coding schemes were reviewed. Special attention was given to CODEN, developed by ASTM for technical periodicals, as a candidate standard. It was determined that the CODEN as presently administered cannot cope adequately with the number of titles that a standard code must provide for. The need for providing conversion from existing codes to the Standard Serial Number is recognized, however.

1.34 Cost

Considerations common to all feasibility studies of any new system are both the costs of developing and the costs of operating the new system, and how these amounts compare with the cost of maintaining or tuning-up an existing system. The general consensus is that precious little information on this important area is reported in the literature; it is not only inadequate but is often confusing and contradictory. There are several reasons for this state of affairs. First, there are many variables affecting cost figures and a unique set of variables may apply to each institution. For example, for large scale conversion from manual to machine readable records, figures range from $.27 per record at the Washington University School of Medicine Library to $1.57 at the Library of Congress RECON Project [80].

Another reason is the lack of clear distinction between developmental and operating costs. Defining developmental costs as "non-recurring" and operating costs as "the day-to-day costs to maintain the system" does not throw any light on how to consider the costs for upgrading an operational system. A brief acquaintance with the development of library automated systems reveals that changes made to operational systems are the rule rather than the exception. Since most libraries do not own their own computers, equipment change which requires reprogramming frequently occurs. Expansion in the number of applications of the system after an initial design is implemented is another reason for continual modification.

Comparing the cost of manual systems with the cost of automated systems is a difficult task at best. In a manual system, a product or a process can be isolated to allow the calculation of a unit cost. In an automated system, a single product (such as a machine-readable data base) can have many by-products, some of which may be unknown initially. Unit cost comparisons can therefore be misleading unless the method of costing is described. Comparison of the total cost of one system with the total cost of another system

performing the same functions or producing the same products does not necessarily give a true picture either. Intangible factors, such as improvement of service to users and increased efficiency in the use of professional staff, are difficult to translate to exact dollar figures.

This is not to say that cost reporting is a futile exercise for, as long as libraries have to compete with other agencies and organizational units for funds, a proposed system must be proven not only economically feasible but economically necessary, if the library is to continue meeting increased demands and improving the quality of service to the users.

1.35 Serials control and related systems

To describe each serial control and related system falling within the scope of the study would be, at best, to extract from the more comprehensive surveys mentioned earlier. To meet the specific objective of identifying those institutions which are the most likely candidates for further investigation, the findings of the literature search are presented and compared by means of a two-dimensional matrix of institutions and the serials control and related system applications within those institutions [Table I].

The selection of the institutions included in the matrix is based on the criteria defined earlier in Section 1.2. In addition, preference is given to those institutions with a planned or operational serials control system in addition to a book acquisition system, as well as to those with announced plans to change from a batch to an on-line system. Each application is broken down into the smallest identifiable module. Only those modules stated in the published source are checked off for each institution. Insofar as it can be discerned from available descriptions in the literature, operational modules are distinguished from planned modules by the symbols "O" and "P".

Immediately following Table I is a list of the institutions included in the Table with addresses, and names of persons to contact with their telephone numbers, if available.

Table I

Serials Control and Related Systems

	Pre-Order Search	Book Acquisition	Serial Acqui. & Renewal	Accounting	Check-in	Claiming	Binding	Holding List	Other Lists	Statistics	On-Line Retrieval	In-Process File	Routing
California State Lib. Processing Center		P	P	P	P	P	P	P	P	P			P
Cleveland State Univ. Libraries		O	P	P	P	P	P		O			O	
Columbia Univ. Butler Library	O	O	P	O				O	O			P	
Faxon Co., Inc.		O	O	O		P			O	O	O		
Franklin Square Subscription Agency		O	O	O		P			O	O	O		
Harvard College Library		O	P	P	P	P	P	O	O				
Iowa State Univ. Library			P		P	P	P	P					P
Keio Univ. Kitasato Mem. Medical Library			O	O	O	O	O	O	O				
Kent State Univ. Library		P		P		P		O		O	P		
Laval University	O			O	P						O		
Library of Congress	P	P	P	P								P	

Table I (continued)

	Pre-Order Search	Book Acquisition	Serial Acqui. & Renewal	Accounting	Check-in	Claiming	Binding	Holding List	Other Lists	Statistics	On-Line Retrieval	In-Process File	Routing
Massachusetts Inst. of Technology										O			
New York Public Library			P	P	P	P	P	P	P	P			P
New York State Library			O	O	O	O	O	O	O	O			
Northwestern Univ. Library			P	P	P	P	P	P	P	P			P
Ohio College Library Center			P	P	P	P	P	P	P			P	
Oregon State Univ. Library		O		O									
Purdue University									O				
San Francisco Public Library		P	O	O	O	P	O	P	O	O			
Stanford University Libraries		P							O				
Univ. of Calif., Los Angeles Biomedical Library			O	O	O	O	O	O	O	O	O		
Univ. of Calif., San Diego Library		P	P	P	O	O	O	O	O				
Univ. of Chicago Library		O	O	O					O	O			O

Table I (continued)

	Pre-Order Search	Book Acquisition	Serial Acqui. & Renewal	Accounting	Check-in	Claiming	Binding	Holding List	Other Lists	Statistics	On-Line Retrieval	In-Process File	Routing
Univ. of Guelph Libraries	O	O	O	O	P	P	P	O	O	O		O	P
Univ. of Minn. Biomedical Library			O	O	O	O	O	O	O				
Univ. of Texas, Galveston Biomedical Library	P	P	P	P	P	P	P	P	P	P	P	P	P
Washington State Library	O	O	P	P	P	P			O		O	O	
Washington Univ. School of Medicine Library		O		O	O	O	O	O	O	O			O

List of Institutions and Contacts

California State Library Processing Center
P. O. Box 2037
Sacramento, California 95801
Hildur Howe, Supervisor

Cleveland State University Libraries
East 24th and Euclid Avenue
Cleveland, Ohio 44115
Raymond B. Collins, Assistant Director
Libraries for Systems and Technical Services
(216) 771-0250

Columbia University
Butler Library
New York, New York 10027
Paul Fasana, Assistant Director, Systems
(212) 280-2269

Faxon Co., Inc.
15 Southwest Park
Westwood, Mass. 02090
Frank Clasquin, Vice President
(617) 329-3350

Franklin Square Subscription Agency
Cedar Lane
Teaneck, New Jersey
Carl Reiman, Vice President
Data Processing

Harvard College Library
Cambridge, Mass. 02138
Colin McKirdy
Data Processing
(617) 495-3724

Iowa State University Library
Ames, Iowa 50010
Charles Sage, Coordinator
Automated Library Services
(515) 294-2172

Keio University
Kitasato Memorial Medical Library
Tokyo, Japan
K. Urata

Kent State University Libraries
Kent, Ohio 44240
H. Duncan Wall, Assistant Director
Planning and Development

Laval University
Library Analysis and Automation
Quebec 10E, Canada
Rosario de Varennes, Director

Library of Congress
Information Systems Office
Washington, D. C.
Sally Montoya, Automation of the Order Division
Herbert Peress, Central Bibliographic System
Elaine Woods, Standard Serial Number, MARC Format for Serials
(202) 426-5000

Massachusetts Institute of Technology Library
Cambridge, Mass. 02139
Joseph Dagnese, Assistant Director

New York Public Library
20 West 53rd Street
New York, New York 10036
Tom Parr, Director
Systems Analysis and Data Processing Dept.
(212) 790-6319

New York State Library
Albany, New York 12224
Mary Jane Reed, Head
Computer Applications Section
(518) 474-2847

Northwestern University Library
Technological Institute
Evanston, Illinois 60201
Joseph Paulukonis, Acting Librarian
(312) 492-3361

Ohio College Library Center
1314 Kinnear Road
Columbia, Ohio 43212
Frederick G. Kilgour, Director
(614) 422-8509

Oregon State University Library
Corvallis, Oregon 75331
Bradny K. Waldron, Head

Purdue University
Lafayette, Indiana 47907
Donald P. Hammer, Head
Library Systems Development

San Francisco Public Library
Civic Center
San Francisco, California 94102
Linda F. Crismond, EDP Coordinator

Stanford University Libraries
Stanford, California 94305
Allen Veaner, Assistant Director
Bibliographic Operations

University of California, Los Angeles
Biomedical Library
Los Angeles, California 90024
James Fayollat

University of California,
San Diego Library
La Jolla, California 92037
Don L. Bosseau, Director
Library Systems Development
(714) 453-1963

University of Chicago Library
Chicago, Illinois 60637
Charles Payne
System Development Librarian

University of Guelph Libraries
Ontario, Canada
Margaret Beckman
Systems Librarian
(519) 824-4120

University of Minnesota
Biomedical Library
Diehl Hall
Minneapolis, Minn. 55455
Audrey Grosch, Technical Director
Systems Division
(612) 373-2851 ext. 4533

University of Texas, Galveston
Biomedical Library
P. O. Box 253
Galveston, Texas 77550
(713) 765-1011

Washington State Library
Olympia, Washington 98501
Josephine S. Pulsifer, Chief
Technical Services and Development

Washington University School of Medicine Library
4580 Scott Avenue
St. Louis, Missouri 63110
Glyn Evans, Research Assistant
Machine Methods
(314) 367-6400 ext. 453

Among the systems identified as meeting the criteria for this study, two major systems can be described as on-line serials control systems with on-line retrieval and file update capabilities. These are, Laval University and UCLA Biomedical Library, which share some similar characteristics: both are developed from earlier batch systems and both use cathode ray tube (CRT) terminals. Neither system as yet has the capability of automatically initiating claim notices based on the expected receipt date of issues.

The Laval University System has been operational since June 1968 [90, 91, 92]. The present system, operating with an IBM 360/50, provides control of serials holdings of nine campus libraries with a total of 16,000 titles in the data base. A major drawback of the system is the limitation of access by the system control number, a feature which requires a manual look-up. This limitation requires that check-in be performed manually. The data is recorded on input sheets which are batched and entered on IBM 2260 CRT terminals. Initial attempts to overcome this limitation were made by applying IBM's Document Processing System to search a sample file consisting of 100 records. The conclusion arrived at was that interactive searching of the total file is too expensive at this time. An interesting feature of the Laval system is the update procedure in which changes to the file are accumulated in a temporary working area on disk. Accessing a record in the Master File with a modification temporarily stored in the buffer calls up both the master record and the modification as though it were one record. The Master File is updated at regular intervals.

The second on-line serials control system is being developed at the UCLA Biomedical Library on a grant from the National Library of Medicine [95, 96]. The system is capable of displaying holdings and other information on 12,000 serial titles through IBM 2260 CRT terminals. Access is by title, language and country of publication. Claiming is based on claiming history and a comparison of frequency of publication with the date of receipt of past issues. The automatic production of claim and binding notices are planned.

Of the remaining institutions, Northwestern University in Evanston, Illinois is currently engaged in on-line conversion of 15,000 serial titles which would serve as the data base for a comprehensive serials control system which will operate in the on-line mode for retrieval and file update. A search code based on the main entry and title will be used to enter the file. It is expected that the check-in function will be implemented first.

The University of Texas Biomedical Library in Galveston takes the total system approach. Serials control is a module in the total system which will operate on-line. There are approximately 4,000 serial titles in the collection, 3,000 of which are currently received. The UCMP data base will be used to build the serials system data base.

Activities in other UC campuses, in addition to the UCLA Biomedical Library, are of note. The San Diego campus has one of the first serials control systems in a university library and its system is widely copied [85, 86]. The current system, with a data base of 24,000 titles, operates batch mode with card input and tape storage. Outputs include a university-wide holdings list published monthly and supplemented by a daily arrivals list which is cumulated weekly. Check-in is performed on a list of expected arrivals. Prepunched cards are pulled from the transaction file according to the titles checked in on the list. The cards are then used to update the master file. Titles not checked in are considered as potential claims. Titles which are ready for binding are listed separately. Acquisitions and accounting functions are not incorporated into the system but will be part of the planned acquisitions system.

The San Diego system has undergone extensive modifications, due to increased file size and activity as well as equipment changes. These modifications are described in Bosseau's papers [85, 86]. Plans include the provision of decentralized check-in by providing tailored check-in lists to branch libraries. This plan will allow materials to reach the users sooner, with the retention of centralized record keeping. The check-in list will use full titles rather than mnemonic titles since, it was discovered, that the use of mnenomic titles created learning problems for new staff members. The idea of eliminating cards for the check-in operation by utilizing machine readable score sheets through mark sensing or other methods is being investigated.

The University of Minnesota Biomedical Library has a system similar to the one at San Diego [98, 99]. Accounting and ordering procedures are incorporated into their acquisition system. There are 8,100 titles in the data base; 2,100 of which are active.

The PHILSOM system at the Washington University School of Medicine Library has the same basic features as the San Diego and Minnesota systems with one major difference: check-in is performed with prepunched arrival cards rather than on arrival lists [94]. In addition to serving the university library, the PHILSOM system is capable of processing serials for other libraries by providing prepunched arrival cards, claims, binding and subject listings, as well as holdings lists.

A significant recent development involving the UC campuses is the establishment of the Library Systems Development (LSD) Program. The objective of this organization is to develop a single system design and software for similar computer configurations now located on the various campuses. Funds are being sought to support this effort.

Any automation development at the Library of Congress is significant in view of the Library's national role. The MARC format for monographs and, more recently, for serials and maps is a significant milestone in the development of national standards. The distribution of MARC tapes have resulted in a number of applications -- selective dissemination of information, production of catalog cards, and acquisitions. Also underway is the RECON Project to convert manual records to machine readable records. For the Library's internal functions, the Central Bibliographic System (CBS) takes a total approach to library automation. In terms of LC operations, the central bibliographic apparatus services new material acquisition, cataloging, reference, material status and location, and bibliographic product preparation, i.e., book catalogs. In terms of types of materials, it covers monographs, serials, and maps [133].

Of the four tasks of LC's design of the Central Bibliographic System, the first three resulted in a functional description of the System. Task IV includes the determination of the design parameters, logical and physical file design and operating systems evaluation.

On the state level, recent developments include the operation of a batch oriented serials control system at the New York State Library encompassing basic applications [103]. The system provides the capability of claiming non-receipt of issues, detecting subscription expirations, scheduling binding procedures, printing various lists, and generating statistical reports. The State Library plans to use its system as a nucleus for a future statewide automation effort. A study to determine the feasibility of remote access catalog is currently underway at the State Library.

The Serials Record Control System at the Kitasato Memorial Medical Library of Keio University in Japan deserves special mention [106]. It is a batch oriented system operating with 4,500 titles in the data base and claims to be the first system with the capability of issuing claim notices automatically. The description of the system does not provide details on the claiming procedure.

Among the largest libraries and library networks with plans to develop a serials control system are Harvard University, New York Public Library, Columbia University, the California State Library Processing Center, and the Ohio College Library Center.

Since acquisitions is a module in a comprehensive serials control system, the major developing and operational acquisitions systems are of interest. In addition to the collaborative efforts of Stanford, Columbia and the University of Chicago, Washington State University's LOLA Library On-Line Acquisitions system [109] and a similar system called LOLITA at Oregon State University [128], and that of the University of Massachusetts [118] are of note.

Stanford University has two complementary projects: SPIRES -- Stanford Public Information Retrieval System, and BALLOTS -- Bibliographic Automation of Large Libraries using a Time Sharing System [125, 136]. BALLOTS I is a prototype technical processing system with capabilities for searching, ordering, receiving, accounting, and printing various lists. Access to the inprocess file is on-line through IBM 2741 terminals. The prototype system lays the groundwork for creating a production library processing system for a large research library -- BALLOTS II [130].

BALLOTS I was evaluated prior to initiating BALLOTS II. Among the conclusions reached was that the provision of on-line file searching was not only feasible but necessary to provide maximum benefit from machine maintained files. It was further concluded that effective utilization required high speed graphic terminals for file display. A survey of existing terminal devices revealed no reasonably priced devices capable of meeting the project's requirements. Following the example of MIT's Project INTREX, the Stanford Computational Center is studying the possibility of using standard components to assemble its own display terminal.

Although library networks per se is not a topic of this report, special mention has to be made of those library networks which engage in automation projects in general and have specific plans for a serials control system. Such a system, serving multiple libraries, comes closest to the FAUL concept.

In almost every case, the first project of library networks is a technical processing center supplying catalog cards and related products to its participating members. Typical examples include the New England Library Network (NELINET), the Ohio College Library Center (OCLC), the California State Library Processing Center, the Universities of Metropolitan Washington and IBM's System Development Division Library in Poughkeepsie. OCLC's plans include a shared cataloging system, information retrieval and a serials control system [120]. The Universities of Metropolitan Washington has published a feasibility study recommending a central computer facility. The System Development Division of IBM has a network of seven libraries linked by 2741 terminals with the capabilities for text editing, circulation control, and the ordering and routing of titles. At present, the major function of the IBM network is the acquisition and processing of monographs through its Library Processing Center. It is claimed that cost savings have increased as more members are linked to the network but it is not clear if line charges are included in the cost figures [108].

The California State Library Processing Center has recently published a five-volume report describing the system specifications for a batch oriented serials control system designed to serve multiple libraries [97]. The system assists in ordering, subscription renewal, expected arrivals, claiming, binding, and

holdings inventory. An interesting feature of the system is the provision for optional services and the method of assessing costs based on actual services performed. In addition to optional services, provision is also made for receiving and printing variations in terminology of data elements and their order of presentation. This feature is important in the design of a centralized serials control system, since, in addition to the problems inherent in serials control, a centralized system has to meet the varying requirements of participating libraries.

In planning for a serials control system, the interface with commercial jobbers acting as agents in the dealings of libraries with publishers, especially those who have machine systems, is an important consideration. Two such jobbers, Faxon Co., Inc. and Franklin Square Subscription Agency, are included in Table I.

This interface is accomplished in at least one case, that of the University of Guelph in Canada, where the acquisition system uses a VIATRON terminal to collect the data for the jobber's machine system. This system has enabled the Library to substantially reduce its acquisitions staff but requires a commitment to the services of the jobber on the part of the library. The systems at Faxon and Franklin Square are designed primarily to improve the efficiency and accuracy of internal operations. However, the possibilities of linking a jobber's and a library's machine systems exist and require further investigation on both sides.

The Faxon and Franklin Square systems are basically the same: both use IBM 360/40's and 2260 CRT terminals. The major difference is that all file updates at Franklin Square are done on-line. The Faxon title file is accessed by a local control number unique to each title, or by full title. At Franklin Square there is an elaborate query system which permits entrance to the file by an eight-character mnemonic code based on the title, or by full title. The following operational features are common to both systems:

- On-line retrieval of customer accounts.
- On-line retrieval of publisher's records -- names, addresses, titles published and subscription rates.
- Automatic production of invoices tailored to customer requirements.
- Automatic billing to customers.
- Accounting including the production of checks in payment to publishers.

1.4 SUMMARY AND CONCLUSIONS

Task 1 was described earlier as essentially a literature search. It has turned out to be more than that. It is perhaps better characterized as an information search which tapped the traditional sources of information -- verbal conversations, correspondence, and published and unpublished works. Starting with the published literature, selected leads were followed up by direct correspondence or conversations, culminating in even more selected site visits. This type of information gathering is a process which continued throughout Phase I.

It becomes quite apparent that a literature search has limited value except as a starting point. It should also be noted that the time lag between writing and publishing a report often leads to inaccuracies especially where projections and plans are concerned. In order to portray an accurate picture of the feasible alternatives, more current and detailed information is required than is available in the literature. Site visits provide first hand information but they are expensive and time consuming from the point of view of both the visitor and the visited. There is a real need to exchange views and information on a current basis, and it is hoped that this report partially fulfills this need.

The following conclusions are drawn from the literature:

1. There is a growing body of opinion, although not supported by quantitative data, that the traditional procedures in libraries are increasingly unable to maintain the same level of service in the face of increasing user demands and growing collections, and that automation in libraries will become an economic necessity rather than a luxury. The major arguments for automation are:

    - The increased volume of printed materials.
    - Limited resources in the face of increasing demands.
    - Shortage of manpower and the increase of personnel costs.
    - Extension of library services.
    - The trend of technology toward more efficient and lower-priced machines, and low-cost, mass storage devices.

2. The problems most often reported in the literature with regard to automation in libraries in general are:

- The lack of qualified personnel.
- The need to educate the library staff in the use of new devices.
- The need for continuous modification of an operational system due to equipment changes, increased file size and activity, and expanded applications.
- The lack of program documentation.
- The underestimation of the resources required to put manual files in order and to convert them to machine-readable form.
- The high cost of designing, implementing, and operating an automated system.
- The inability of present systems to handle non-Roman characters (except in Computer Output Microfilm units).
- The lack of standardization and the resulting duplication of effort. Ideally, bibliographic data should be converted to machine readable form only once and then distributed to users. But data bases available in machine readable form from sources such as Faxon, Franklin Square, the Institute of Electrical and Electronic Engineers (IEEE), and Chemical Abstracts Service, and from libraries such as Stanford, the Medical Library Center of New York and others with converted shelf lists, find little or no use outside of the institutions which produce them (with the possible exception of the Medical Library of New York's UCMP). The Library of Congress MARC format is internationally accepted, but few systems use the MARC data without changing it. Often, local requirements and policies are the stumbling blocks to the acceptance of a data base which has been built by others.

3. In view of the high cost of automation and in recognition of the fact that human and financial resources are limited, the following trends are discernible:

- Collaborative systems design as exemplified by the Stanford-Columbia-Chicago group.

- Library networks with a central computer facility and systems staff. The Ohio College Library Center and the Universities of Metropolitan Washington are going in this direction.

- Standardization. The ultimate solution for eliminating duplication of effort is to have a single system design and software package for a group of libraries using the same type of hardware. The Library Systems Development Program, a newly formed organization comprising the University of California libraries, takes this approach.

4. The findings of studies made on how users approach periodical literature indicate that, in 85% of the cases, users have a specific reference in mind. The immediate conclusion is that local bibliographic tools such as the card catalog have the primary function of supplying location and holdings information. If this is accepted as true, the cost benefit of full cataloging, including subject assignment and classification, is questionable. Increasing costs and decreasing budgets will force libraries to examine the role of local bibliographic tools and their relationship with indexing and abstracting services.

5. Surveys of automation activities in libraries reveal that an area of intense effort is the control of serials. Listed below are the primary reasons mentioned for the selection of serials control as the automation project:

   - Serials are the most important library materials in the scientific fields and their control is essential.

   - The cost of acquiring and processing serials is high and is increasing.

   - The control of serials is a significant and complex problem in most manual systems and requires a large clerical staff experienced in dealing with problems unique to serials. A large clerical staff usually has high turnover rates with a concomittant requirement for training.

   - The public access to serial holdings is limited even when manual files are duplicated.

- Because of the size and number of files used for serials control and the number of clerical procedures involved, the computer and other technological devices, such as microform and videographic techniques, can be used to advantage.

- Serials control is a relatively easy process to isolate and can be implemented with minimum disruption of the other functions of the library.

6. The most common reasons given for not selecting serials control as an area for automation are:

   - Serial control is a complicated system requiring a significant investment. Experience with automation should first be gained with relatively simpler systems.

   - Developments in the national and state levels justify the delay of plans for developing independent systems.

   - Regional networks are developing systems to serve their members.

   - Computer-assisted control of serials, especially for claiming and binding, requires that many variables be identified and incorporated into the logic of the programs.

7. Traditionally, computers are used by libraries to produce and maintain lists. The development of automation of serials control is in line with tradition. Most serials systems are still in this stage of automation. Within the last ten years, serials control systems have been designed with varying degrees of comprehensiveness and sophistication. With few exceptions, these systems are best characterized as computer-assisted rather than automated serials control systems. The prevailing operating mode is batch rather than on-line. The two present-day operational on-line systems have evolved from earlier batch systems.

8. In addition to the problems inherent in library automation projects in general, there are difficulties peculiar to the automation of serial control. The experience of the Purdue University Library with its serials control system indicates that attempting to predict too closely for check-in, claiming or binding operations causes the system to fail. On the other hand, lenient prediction results in a large number of expected titles in batch oriented systems, tardy and ineffective claims, and late binding.

A characteristic of serials control systems is the requirement for frequent file update to indicate holdings. Serial titles and main entries are less stable than monographic entries as a whole, requiring more frequent record modification. The high rate of update transactions and the duplication of files make on-line centralized record keeping attractive.

9. The concept of having a common data base containing the holdings of more than one library is the differentiating feature of a centralized serials control system. Its major advantage is to minimize duplication of files without sacrificing access and allow the materials to take the shortest route from the source to the user. It also permits a library to automate its serials control without carrying the burden of the entire developmental cost. On the other hand, it requires that the participating libraries be able to agree on the basic operating characteristics of the system. A centralized serials control system should be flexible enough to provide non-standard products and services required by its users.

10. The most common problem voiced by those responsible for operating library systems is the lack of control over computer services. On the other hand, few libraries can justify a dedicated computer. A possible solution is a central computer facility which serves more than one library. Crucial to the success of this approach is a commitment on the part of member libraries which extends beyond financial support.

2.1 BIBLIOGRAPHY

BIBLIOGRAPHIES, SURVEYS AND STATES-OF-THE-ART

1. Bryn, James H.: "Automation in university libraries -- the state of the art," LIBRARY RESOURCES AND TECHNICAL SERVICES 13:4 (Fall 1969), 520-530.

2. Jackson, Eugene B.: "The SLA/ALA/LTP survey of library automation activities; a summary review," In Carroll, Dewey, ed., CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, 5th, 1967. Proceedings. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1967), 130-181.

3. Jackson, Eugene B.: "The use of data processing equipment by libraries and information centers -- the significant results of the SLA/LTP survey," SPECIAL LIBRARIES 58:5 (May-June 1967), 317-327.

4. Kershaw, G.A.; et. al.: STUDY OF MECHANIZATION IN DOD LIBRARIES AND INFORMATION CENTERS. (Booz, Allen Applied Research, Inc., 1966). AD 640 100.

5. McCune, Lois C.; Salmon, Stephen R.: "Bibliography of library automation," ALA BULLETIN 61:6 (June 1967), 674-694.

6. Markuson, Barbara Evans: "Application of automation in American libraries, an analysis of the LARC survey returns," LARC REPORTS 3:1 (April 1970), 1-12.

7. Mason, Charlene, comp.: "Bibliography of library automation," ALA BULLETIN 63:3 (September 1969), 1117-1134. ERIC/CLIS Bibliography series no. 2.

8. Neeland, Frances: A BIBLIOGRAPHY ON INFORMATION SCIENCE AND TECHNOLOGY," (Santa Monica, California, System Development Corp., 1967), Parts I-IV.

9. Neeland, Frances: "Bibliography on library automation," In Kilpatrick, Dorothy, ed., LIBRARY AUTOMATION HANDBOOK. (Detroit, Mich., Management Information Services, 1970), 7-287.

10. New, Debra, comp. & ed.: A SURVEY OF AUTOMATION ACTIVITIES IN THE LIBRARIES OF THE U.S. & CANADA (The LARC ASSOCIATION, 1970).

11. Overmyer, LaVahn: LIBRARY AUTOMATION: A CRITICAL REVIEW. (Cleveland, Ohio, Case Western Reserve University, School of Library Science, 1969). ED 034 107.

12. Parker, Ralph H.: "Library automation," In Cuadra, Carlos A., ed., ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY, vol. 5. (Chicago, Ill., Encyclopedia Britannica, 1970), 193-222.

13. Speer, Jack A.: LIBRARIES AND AUTOMATION: A BIBLIOGRAPHY WITH INDEX. (Emporia, Kansas, Kansas State Teachers College Press, 1967).

14. Stevens, Mary Elizabeth: RESEARCH AND DEVELOPMENT IN THE COMPUTER AND INFORMATION SCIENCES. Vol. I: Information acquisition, sensing and input: a selective literature review. Vol. II: Processing, storage and output requirements in information processing systems: a selective literature review. (National Bureau of Standards, 1970) Vol. I: ED 039 891; Vol. II: ED 039 892.

15. Steward, Bruce: "Automation serials systems in perspective," In Salmon, Stephen R., ed., LIBRARY AUTOMATION: STATE OF THE ART REVIEW. (Chicago, American Library Association, 1969), 131-137.

BACKGROUND INFORMATION

16. Balfour, Frederick M.: "Conversion of bibliographic information to machine readable form using on-line computer terminals," JOURNAL OF LIBRARY AUTOMATION 1:4 (December 1968), 217-226.

17. Bishop, David; Milner, Arnold L.; Roper, Fred W.: "Publication patterns of scientific serials," AMERICAN DOCUMENTATION 16:2 (April 1965), 113-131.

18. Chapin, Richard E.: "Administrative and economic considerations for library automation," In Carroll, Dewey, ed. CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, 5th, 1967. Proceedings. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1967), 55-69.

19. Dougherty, Richard M.; Stephens, James G.: INVESTIGATION CONCERNING THE MODIFICATION OF THE UNIVERSITY OF ILLINOIS COMPUTERIZED SERIALS BOOK CATALOG TO ACHIEVE AN OPERATIVE SYSTEM AT THE UNIVERSITY OF COLORADO LIBRARIES. (Boulder, Colo., University of Colorado Libraries, 1968). PB 178 216.

20. Fasana, Paul J.: THE COLLABORATIVE LIBRARY SYSTEMS DEVELOPMENT PROJECT: A MECHANISM FOR INTER-UNIVERSITY COOPERATION. Paper presented at the Collaborative Library Systems Development Project Conference, New York, N.Y., November 1970.

21. Grosch, A.N.: "Implications of on-line systems techniques for a decentralized research library system," COLLEGE AND RESEARCH LIBRARIES 30:2 (March 1969), 112-18.

22. Hammer, Donald P.: "Problems in the conversion of bibliographic data," AMERICAN DOCUMENTATION 19:1 (January 1968), 12-17.

23. Jolliffe, J.W.; Lune, M.B.; Robinson, F.: "Why libraries differ -- and need they?" In Nigel, S.M., et al, ed., ORGANIZATION AND HANDLING OF BIBLIOGRAPHIC RECORDS BY COMPUTER. (Hambden, Conn., Archon Books, 1967), 62-68.

24. King, Gilbert, et al.: AUTOMATION AND THE LIBRARY OF CONGRESS. (Washington, D. C., Library of Congress, 1963).

25. Lipetz, Ben-Ami: "Management considerations in evaluating library automation," In COLLOQUE SUR LES IMPLICATIONS ADMINISTRATIVES DE L'AUTOMATISATION DANS LES GRANDES BIBLIOTHEQUES, Universite de Montreal, 1968, 135-152.

26. Logsdon, Richard H.: "Collaborative library systems development," In Veaner, Allen B.; Fasana, Paul J.,ed., STANFORD CONFERENCE ON COLLABORATIVE LIBRARY SYSTEMS DEVELOPMENT. PROCEEDINGS. 4-5 Oct. 1968. (Palo Alto, Calif., Stanford University Libraries, 1969), 50-54. ED 031 281.

27. McAllister, Caryl: "Cataloging and display of bibliographic information in an on-line catalog," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 11-15 Oct. 1970. Proceedings, vol. 7. (Washington, D.C., ASIS, 1970).

28. Nugent, William R.: "Statistics of collection overlap at the libraries of the six New England state universities," LIBRARY RESOURCES AND TECHNICAL SERVICES 12:1 (Winter 1968), 31-36.

29. Olson, Kenneth D.: "Union lists and the public record of serials," SPECIAL LIBRARIES 61:1 (January 1970), 15-20.

30. Paulson, Peter J.: "Networks, automation and technical services experience and experiments in New York State," LIBRARY RESOURCES AND TECHNICAL SERVICES 13:4 (Fall 1969), 516-519.

31. Shoffner, Ralph M.: JOINT DESIGN AND DEVELOPMENT OF LIBRARY SYSTEMS. (Los Angeles, Calif., Institute of Library Research, University of California, 1967). ED 024 403.

32. Veaner, Allen B.: "The application of computers to library technical processing," COLLEGE AND RESEARCH LIBRARIES 31:1 (January 1970), 36-42.

USER STUDIES

33. Allen, Thomas J.: "Information needs and uses," In Cuadra, Carlos, A., ed., ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY, vol. 4. (Chicago, Encyclopedia Britannica, 1969).

34. Ayres, F. H.; et al.: "Author versus title: a comparative survey of the accuracy of the information which the user brings to the library catalogue," JOURNAL OF DOCUMENTATION 24:4 (December 1968), 266-72.

35. Jain, Aridaman K.: REPORT ON A STATISTICAL STUDY OF BOOK USE. (La Fayette, Ind., Purdue University Library, 1967). PB 176 525.

36. Lipetz, Ben-Ami: "A quantitative study of catalog use," In LIBRARY APPLICATIONS OF CLINIC DATA PROCESSING, 7th, 1969. Proceedings. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1969).

37. Lipetz, Ben-Ami: "User clues in initiating searches in a large library catalog," In Cuadra, Carlos A., ed., ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY, vol. 3. (Chicago, Encyclopedia Britannica, 1968), 137-39.

38. Lipetz, Ben-Ami: USER REQUIREMENTS IN IDENTIFYING DESIRED WORKS IN A LARGE LIBRARY. (New Haven, Conn., Yale University Library, 1970). Final Report. Grant no. SAR/OEG-1-7-071140-4427.

39. Peterson, Stephen L.: "Patterns of use of periodical literature," COLLEGE AND RESEARCH LIBRARIES 30:5 (September 1969), 422-430.

40. Tessier, Judy; Zweizig, Douglas: LIBRARY USE STUDIES: A COMPILATION OF RESEARCH REPORTS ON THE LIBRARY USER INTERFACE. (Syracuse, N. Y., School of Library Science, Syracuse University, 1970).

41. Vickery, Brian C.: "Indicators of the use of periodicals," JOURNAL OF LIBRARIANSHIP 1:3 (July 1969), 170-182.

TECHNOLOGY

42. Avedon, Don M.: "Computer output microfilm: an NMA survey of the field," JOURNAL OF MICROGRAPHICS 3:1 (Fall 1969/70), 7-12.

43. Avedon, Don M.: "An overview of the computer output microfilm field," In American Federation of Information Processing Societies. AFIPS CONFERENCE PROCEEDINGS, vol. 35. 1969 Fall Joint Computer Conference, Las Vegas, Nevada, 18-20 November 1969, 613-623.

44. Burnham, Dwight C.: "Microfilm as computer memory," In Tate, Vernon D., ed.; National Microfilm Association. PROCEEDINGS OF THE ANNUAL MEETING AND CONVENTION, 18th, Annapolis, Md., 1969, 185-191.

45. Cuadra, Carlos A.: "Libraries and the technological forces affecting them," ALA BULLETIN, 63:6 (June 1969), 759-768.

46. Holmes, Donald C.: "The needs of library microfilm users," In Tate, Vernon D., ed., National Microfilm Association. PROCEEDINGS OF THE ANNUAL MEETING AND CONVENTION, 18th, Annapolis, Md., 1969, 256-260.

47. Koeneman, John K.: Schwanbeck, John B.: "Computer microfilm - a cost cutting solution to the EDP bottleneck," In American Federation of Information Processing Societies. AFIPS CONFERENCE PROCEEDINGS, vol. 35. 1969 Fall. Joint Computer Conference, Las Vegas, Nevada, 18-20 November 1969, 629-639.

48. Kuehler, J. D.; Kerby, H. R.: "A photo-digital mass storage system," In American Federation of Information Processing Societies. AFIPS CONFERENCE PROCEEDINGS, vol. 29, 1965 Fall Joint Computer Conference, San Francisco, Calif., 1966, 735-742.

49. Miner, Robert A.: "Digital/graphic record access," MODERN DATA 3:1 (January 1970), 66-68,70.

50. Presnick, Walter: "Breaking the EDP barrier with microfilm input," DATA SYSTEMS NEWS 11:2 (February 1970), 6-8.

51. Simmons, Peter: "Choosing data conversion equipment," COLLEGE AND RESEARCH LIBRARIES 20:5 (September 1969), 431-436.

52. Teplitz, Arthur: "Microfilm and reprography," In Cuadra, Carlos A.,ed., ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY, vol. 5. (Chicago, Ill., Encyclopedia Britannica, 1970), 87-112.

53. Tressel, George W.; et al.: "Automation retrieval and remote viewing of COSATI microfiche - problems and prospects," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 11-15 Oct. 1970. Proceedings, vol. 7. (Washington, D.C., ASIS, 1970), 123-128.

STANDARDS

54. Adams, Scott: "Progress toward a national serials data system," LIBRARY TRENDS 18:4 (April 1970), 520-536.

55. American National Standards Institute. Standards Committee Z39: PROPOSED AMERICAN NATIONAL STANDARD FOR IDENTIFICATION NUMBERS FOR SERIAL PUBLICATIONS. Draft #3. (Unpublished, n.d.)

56. Lazerow, Samuel: "National collaboration and the national libraries automation task force: a course toward compatibility," In STANFORD CONFERENCE ON COLLABORATIVE LIBRARY SYSTEMS DEVELOPMENT, Stanford University, 4-5 October 1968, 55-69. Discussion 70-74.

57. Lazerow, Samuel: "The U. S. National Libraries Task Force," SPECIAL LIBRARIES 59:9 (November 1968), 698-703.

58. U. S. Library of Congress. Information Systems Office. SERIALS: A MARC FORMAT. Preliminary Edition. (Washington, D. C., 1970).

59. Woods, Elaine W.: NATIONAL SERIALS DATA PROGRAM: PHASE I: A WORKING PAPER. (Washington, D. C. Information Systems Office, Library of Congress, August 1967).

COST

60. Baumol, W.: ON THE ECONOMICS OF LIBRARY OPERATION. (Princeton, N. J., Mathematica, 1967).

61. Bourne, C. P.; Kasson, M. S.: PRELIMINARY REPORT ON THE REVIEW AND DEVELOPMENT OF STANDARD COST DATA FOR SELECTED LIBRARY TECHNICAL PROCESSING FUNCTIONS. (Palo Alto, Calif., Information General Corp., 1969).

62. Brown, Robert R.: "Costs and advantages of on-line data processing," DATAMATION 14:3 (March 1968), 40-43.

63. Chapin, Richard E.; Pretzer, Dale H.: "Comparative costs of converting shelflist records to machine readable form," JOURNAL OF LIBRARY AUTOMATION 1:1 (March 1968), 66-74.

64. Childers, Thomas; et al.: BOOK CATALOG AND CARD CATALOG: A COST AND SERVICE STUDY. (Towson, Md., Baltimore County Public Library, 1967).

65. COST FOR LIBRARY SYSTEMS DEVELOPMENT, COLUMBIA UNIVERSITY LIBRARIES, October 1970. (unpublished)

66. Dolby, J. L.; Forsyth, V. J.: "An analysis of cost factors in maintaining and updating card catalogs," JOURNAL OF LIBRARY AUTOMATION 2:4 (December 1969), 218-241.

67. Dolby, J. L.; Forsyth, V. J.: THE COST OF MAINTAINING AND UPDATING LIBRARY CARD CATALOGS. FINAL REPORT. (Los Altos, Calif., R & D Consultants, Co., 1969). ED 035 432. Also in Journal of Library Automation 2:4 (December 1969), 218-241.

68. Dougherty, Richard M.: "Cost analysis studies in libraries; Is there a basis for comparison?" LIBRARY RESOURCES AND TECHNICAL SERVICES 13:1 (Winter 1969), 136-141.

69. Dougherty, Richard M.; Lawrence, Leonard: MANAGEMENT AND COSTS OF TECHNICAL PROCESSES: A Bibliographical Review, 1876-1969. (Metuchen, N. J., Scarecrow Press, 1970).

70. Fasana, Paul J.: "Determining the cost of library automation," ALA BULLETIN 61:6 (June 1967), 656-661.

71. Herner, Saul: "System design, evaluation and costing," SPECIAL LIBRARIES 58:8 (October 1967), 576-581.

72. Keller, John E.: "Program budgeting and cost benefit analysis in libraries," COLLEGE AND RESEARCH LIBRARIES 30:4 (March 1969), 156-160.

73. Kilgour, Frederick G.: "The economic goal of library automation," COLLEGE AND RESEARCH LIBRARIES 30:4 (July 1969), 307-311.

74. King, D. W.; Lancaster, T. W.: "Costs, performance and benefits of information systems," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 1-4 October 1969. Proceedings, vol. 6. (Westport, Conn., Greenwood, 1969), 501-505.

75. Korfhage, R. R.; DeLutis, T. G.: A BASIS FOR TIME AND COST EVALUATION OF INFORMATION SYSTEMS. (Lafayette, Ind., Purdue University, 1969).

76. Kountz, John C.: "Cost comparison of computer vs. manual catalog maintenance," JOURNAL OF LIBRARY AUTOMATION 1:3 (September 1968), 159-177.

77. Leimkuhler, F. F.; Cooper, M. D.: COST ACCOUNTING AND ANALYSIS FOR UNIVERSITY LIBRARIES. (Los Angeles, Calif., University of California, 1970).

78. Maier, Joan M.: "Analyzing acquisitions and cataloging costs," LIBRARY RESOURCES AND TECHNICAL SERVICES 13:1 (Winter 1969), 127-136.

79. Parr, Thomas: "Technical cost considerations in the catalog format of the research libraries," LARC REPORTS 3:3 (Fall 1970), 73-78.

80. Simmons, P. A.: "An analysis of bibliographic data conversion costs," LIBRARY RESOURCES AND TECHNICAL SERVICES 12:3 (Summer 1968), 296-310.

81. Tesovnik, Mary E.: "Unpublished studies of technical service time and costs: a selected bibliography," LIBRARY RESOURCES AND TECHNICAL SERVICES 14:1 (Winter 1970), 56-67.

82. Welch, Helen M.: "Technical service costs, statistics and standards," LIBRARY RESOURCES AND TECHNICAL SERVICES 11:4 (Fall 1967), 436-446.

83. Wessel, C. J.: CRITERIA FOR EVALUATING THE EFFECTIVENESS OF LIBRARY OPERATIONS AND SERVICES. Phase I: Literature survey and state of the art; Phase II: Data gathering and evaluation; Phase III: Recommended criteria and methods for their utilization. (Washington, J. I. Thompson, 1969). AD 676 188. AD 632 751.

SERIALS CONTROL SYSTEMS

84. Belch, David E.: "The computer controlled periodicals system at the San Francisco Public Library," LIBRARY RESOURCES AND TECHNICAL SERVICES 13:4 (Fall 1969), 531-532.

85. Bousseau, Don L.: THE UNIVERSITY OF CALIFORNIA AT SAN DIEGO SERIALS SYSTEM - A CASE HISTORY. Paper presented at the University of Oregon Workshop on Library Mechanization, 1968.

86. Bousseau, Don L.: "The University of California at San Diego serials system - revisited," PROGRAM 4:1 (January 1970), 1-29.

87. Clyde, Eric: "Progress in automation of serials at the National Science Library," In AUTOMATION IN LIBRARIES; Papers presented at the C.A.C.U.L. Workshop on Library Automation, 10-12 April 1967. (Vancouver, University of British Columbia, 1969). ED 021 583.

88. Crismond, Linda F.: "Automated serials check-in and binding procedures at the San Francisco Public Library," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 1-4 October 1969. Proceedings, vol. 6. (Westport, Conn., Greenwood Pub. Corp., 1969), 13-20.

89. Crismond, Linda F.: "A computer system for periodicals," LIBRARY JOURNAL 94:18 (October 15, 1969), 3619-3622.

90. De Varennes, Rosario: "Computerized serials record at Laval University: a progress report," CANADIAN LIBRARY 24 (September 1967), 122-123.

91. De Varennes, Rosario: "Computerized serials systems at Laval University Library: from off-line to on-line, some memories and accomplishments," In C.A.C.U.L. WORKSHOP ON LIBRARY AUTOMATION 1970. Preprint.

92. De Varennes, Rosario: "On line serials system at Laval University Library," JOURNAL OF LIBRARY AUTOMATION 3:2 (June 1970), 128-141.

93. Evans, Glyn T.: "Development of an automated periodical system at the Royal Society of Medicine Library," PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE 62:8 (August 1969), 757-763.

94. Evans, Glyn T.; Frantz, Donald R.: NEW PHILSOM SYSTEM DOCUMENTATION. (St. Louis, Mo., School of Medicine Library, Washington University, 1969).

95. Fayollat, J.: "Computer based serials control system, Biomedical Library, UCLA," AMERICAN DOCUMENTATION 20:4 (October 1969), 385.

96. Fayollat, Jim; Luck, Don: SUMMARY REPORT OF THE UCLA BIOMEDICAL LIBRARY CONTROL SYSTEM FOR SERIALS. (Los Angeles, California, University of California, 1967). PB 179 756. ED 029 67[illegible].

97. Fried, Martin; Dunham, Ruth: CALIFORNIA STATE LIBRARY: PROCESSING CENTER DESIGN AND SPECIFICATION. Vol. I: System description and input processing; Vol. II: File maintenance and output processing; Vol. III: Coding manual; Vol. IV: Serials control system. (Los Angeles, Calif., Institute of Library Research, University of California, 1969).

98. Grosch, Audrey N.: "University of Minnesota Biomedical Library serials system," SPECIAL LIBRARIES 60:6 (July-August 1969), 349-360.

99. Grosch, Audrey N.: "University of Minnesota Biomedical Library serials system," Comprehensive report. Fall 1966- June 1968. (Minneapolis, Minn., University of Minnesota, 1968). ED 021 577.

100. Hammer, Donald: "Automated procedures at Purdue and Indiana University Libraries," In Andrews, Theodora, ed., AUTOMATION IN THE LIBRARY WHEN, WHERE AND HOW. (Lafayette, Ind., Purdue University, 1965), 23-39.

101. Lemkau, Henry: "The design of the automated serials accession system at the Library of the Mount of Sinai School of Medicine of the City University of New York," BULLETIN OF THE MEDICAL LIBRARY ASSOCIATION 58:2 (April 1970), 163-172.

102. Pizer, I.; Franz, Donald R., Brodman, Estelle: "Mechanization of library procedures in the medium sized medical library. I. Serial Record," BULLETIN OF THE MEDICAL LIBRARY ASSOCIATION 51:3 (July 1963), 313-381.

103. Reed, Mary Jane: "Automated serials control system at the New York Library," BOOKMARK 29:10 (July 1970), 377-379.

104. Roper, Fred W.: "Computer based serials control system for a large biomedical library," AMERICAN DOCUMENTATION 19:2 (April 1968), 151-157.

105. Strom, Karen D.: "Software design for biomedical library serials control system," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 20-24 October 1968. Proceedings, vol. 5. (New York, Greenwood Pub. Corp., 1968), 267-275.

106. Urata, K., Nazol, A., Oqawa, H.: "Serials record control system on computer," In Davis, K. Ellison, ed., INTERNATIONAL CONGRESS OF MEDICAL LIBRARIANSHIP, Proceedings, 3rd (Amsterdam, Excerpta Medica, 1970), 178-184.

RELATED SYSTEMS

107. "Automated book ordering system - BATAB," INFORMATION RETRIEVAL AND LIBRARY AUTOMATED LETTER 5:2 (July 1969), 6.

108. Bateman, Betty B.; Farris, Eugene H.: "Operating a multilibrary system by using long distance communication to an on-line computer," In North, Jeanne B., ed.. American Society for Information Science. ANNUAL MEETING. 20-24 October 1968. Proceedings, vol. 5. (New York, Greenwood Pub. Corp., 1968), 155-162.

109. Burgess, Thomas K.; Ames, L. Lola: LIBRARY ON-LINE ACQUISITIONS SUBSYSTEM (Pullman, Systems Office, Washington State University, 1968). ED 029 653.

110. Corbin, John B.: "The centralized processing center of the Texas State Library," TEXAS LIBRARIES 27:3 (Fall 1965), 118-125.

111. Dougherty, Richard M.; Maier, Joan M.: COLORADO ACADEMIC LIBRARIES BOOK PROCESSING CENTER: THE FIRST SIX MONTHS OPERATION. Final Report. Phase III. (Boulder, Colo., University of Colorado, 1970).

112. Dunlap, Connie: "Automated acquisitions procedures at the University of Michigan Library," LIBRARY RESOURCES AND TECHNICAL SERVICES 11:2 (Spring 1967), 192-202.

113. Fasana, Paul J.: "Automation efforts at the Columbia University Libraries," In Veaner, Allen B.; Fasana, Paul J., ed., STANFORD CONFERENCE ON COLLABORATIVE LIBRARY SYSTEMS DEVELOPMENT. PROCEEDINGS. 4-5 October 1968. (Palo Alto, Calif., Stanford University Libraries, 1969), 19-41. ED 031 281.

114. Fussler, Herman H.: "The University of Chicago Library automation project, a summary," In Veaner, Allen B.: Fasana, Paul J., ed., STANFORD CONFERENCE ON COLLABORATIVE LIBRARY SYSTEMS DEVELOPMENT. PROCEEDINGS. 4-5 October 1968. (Palo Alto, Calif., Stanford University Libraries, 1969), 10-18. ED 031-281.

115. Fussler, Herman, H.; Payne, Charles T.: DEVELOPMENT OF AN INTEGRATED COMPUTER BASED, BIBLIOGRAPHICAL DATA SYSTEM FOR A LARGE UNIVERSITY LIBRARY. (Chicago, Ill., University of Chicago Library, 1968). PB 179 426.

116. INFORMATION RETRIEVAL (SPIRES) AND LIBRARY AUTOMATION (BALLOTS) AT STANFORD UNIVERSITY, (Stanford, Calif., Stanford University, 1970). I/F-70-1.

117. Johnson, Richard D.: "A book catalog at Stanford," JOURNAL OF LIBRARY AUTOMATION 1:1 (March 1968), 13-50.

118. Kennedy, James H.; Sokoloski, James S.: "Man machine considerations of an operational on-line university library acquisitions system," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 11-15 October 1970. Proceedings, vol. 7. (Washington, D. C., ASIS, 1970), 65-68.

119. Kessler, M. M.: "The technical information project of the Massachusetts Institute of Technology," In Goldhor, Herbert, ed., CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, 4th, 1966. Proceedings, 4th, 1966. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1966), 7-17.

120. Kilgour, Frederick G.: "Initial system design for the Ohio College Library Center; a case history," In Carroll, Dewey, ed., CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, UNIVERSITY OF ILLINOIS, 6th, 1968. Proceedings. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1968), 79-80.

121. Kountz, John C.; Norton, Robert E.: "BIBLIOS: a modular approach to total library ADP," In North, Jeanne B.,ed., American Society for Information Science. ANNUAL Meeting, 1-4 October 1969. Proceedings, vol. 6. (Westport, Conn., Greenwood Pub. Corp., 1969), 39-52.

122. Markuson, Barbara Evans: "The Library of Congress automation program -- a progress report to the stockholders," ALA BULLETIN 61:6 (June 1967), 647-655.

123. Morris, Ned C.: "Computer based acquisitions systems at Texas A & I University," JOURNAL OF LIBRARY AUTOMATION 1:1 (March 1968), 1-72.

124. Nugent, William R.: "NELINET - the New England library information network," In CONGRESS OF THE INTERNATIONAL FEDERATION FOR INFORMATION PROCESSING, 4th, Edinburgh, 5-8 August 1968. Proceedings. (Amsterdam, North Holland Publishing Co., 1968), G28-G32.

125. Parker, Edwin B.: SPIRES: STANFORD PUBLIC INFORMATION RETRIEVAL SYSTEM. 1969-70 ANNUAL REPORT. (Palo Alto, Calif., Institute for Communication Research, Stanford University, 1970).

126. Payne, Charles T.: "An integrated computer based bibliographic data system for a large university library," In Carroll, Dewey, ed., CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, 5th, 1967. Proceedings. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1967), 29-40.

127. Payne, Charles T.; Hecht, Kennie: UNIVERSITY OF CHICAGO'S BOOK PROCESSING SYSTEM. In Veaner, Allen B.; Fasana, Paul J., ed., STANFORD CONFERENCE ON COLLABORATIVE LIBRARY SYSTEMS DEVELOPMENT. PROCEEDINGS. 4-5 October 1968. (Palo Alto, Calif., Stanford University Libraries, 1969), 119-143. ED 031 281.

128. Reimers, Paul: "Automation at the Library of Congress," Presented at the 15th International Meeting of the Institute of Management Sciences, Cleveland, Ohio, 11-13 September 1968.

129. Spigai, Frances; Taylor, Mary: Jennings, Michael A.: A PILOT ON-LINE LIBRARY ACQUISITIONS SYSTEM. (Corvallis, Computer Center, Oregon State University, 1968). ED 024 410.

130. Stanford University Libraries: PROJECT BALLOTS NEWS-LETTER. Stanford, Calif., Stanford University Libraries No. 1-4, June 1969 - March 1970.

131. Stein, Theodore: CENTRALIZED BOOK ACQUISITION FOR NEW YORK STATE: PROPOSED COMPUTER SYSTEM. Part I: System Definition. Part II: System Design. (Albany, N.Y., State University of New York, 1967), Pt. I: ED 021 575 Pt. II: ED 021 576.

132. Stewart, Bruce W.: "Data processing in the Texas A & M University Library," In Goldhor, Herbert, ed., CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, 4th, 1966. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1966), 167-194.

133. Systems Architects, Inc.: CENTRAL BIBLIOGRAPHIC SYSTEM FILE DESIGN. Part I: Introduction and summary: Part II: CBS data case information requirements: Part III: Logical file organization; Part IV: Physical file organization; Part V: File management software; Part VI: Evaluation of data management packages vis-a-vis file management software requirements. (Braintree, Mass., Prepared for the Information Systems Office, Library of Congress, 1970).

134. Terrant, Seldon, W.; Wood, J. L.: "Operational computer based systems at the Chemical Abstracts Service," In Goldhor, Herbert, ed., CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, 4th, 1966. Proceedings, 4th, 1966. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1966), 124-166.

135. Thompson, James W.; Muller, Robert, H.: "A computer based book order system at the University of Michigan Library: a review and evaluation," In Carroll, Dewey, ed.: CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING, UNIVERSITY OF ILLINOIS, 6th, 1968. Proceedings. (Urbana, Ill., Graduate School of Library Science, University of Illinois, 1968), 54-78.

136. Veaner, Allen B.: PROJECT BALLOTS: BIBLIOGRAPHIC AUTOMATION OF LARGE LIBRARY OPERATIONS USING A TIME SHARING SYSTEM. Progress Report (3/27/69-6/26/69) (Palo Alto, Calif., Stanford University Libraries, 1969). ED 030 777.

137. Veaner, Allen B.; Fasana, Paul J., ed.: STANFORD CONFERENCE ON COLLABORATIVE LIBRARY SYSTEMS DEVELOPMENT. PROCEEDINGS. 4-5 October 1968. (Palo Alto, Calif., Stanford University Libraries, 1969), 42-49. ED 031 281.

RELATED RESEARCH

138. "An experimental approach to creating a central record that provides for individual autonomy...based on a proposal submitted by a group of library students," LARC REPORTS (July 1968), 1-12.

139. Black, Donald V.: "Library information system time sharing system. System Development Corporation's LISTS projects," CALIFORNIA SCHOOL LIBRARIES 40:3(March 1969), 121-126.

140. Black, Donald V.: Bethe, Donald M.: "Library serials control using a general purpose data management system," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 1-4 October 1969. Proceedings, vol. 6. (Westport, Conn, Greenwood Pub. Corp., 1969), 5-11.

141. Bregzis, Ritvars: MACHINE READABLE BIBLIOGRAPHIC RECORDS: CRITERIA AND CREATION. Eric Clearinghouse on Library and Information Sciences, 1970. ED 039 388.

142. Cunningham, Jay L.; Schrieber, William D.; Shoffner, Ralph M.: A STUDY OF THE ORGANIZATION AND SEARCH OF BIBLIOGRAPHIC HOLDINGS RECORDS IN ON-LINE COMPUTER SYSTEMS. Phase I. (Berkeley, Calif., University of California, Institute of Library Research, 1969), ED 010 925.

143. Curran, Ann T.: Avram, Henriette D.: THE IDENTIFICATION OF DATA ELEMENTS IN BIBLIOGRAPHIC RECORDS. FINAL REPORT OF THE SPECIAL PROJECT ON DATA ELEMENTS FOR THE SUBCOMMITTEE ON MACHINE INPUT RECORDS (SC-2) OF THE SECTIONAL COMMITTEE ON LIBRARY WORK AND DOCUMENTATION (Z-39) OF THE UNITED STATES STANDARDS INSTITUTE. (1967). AD 666 447.

144. Dardano, Richard V.: USERS MANUAL: GENERALIZED INFORMATION STORAGE AND RETRIEVAL QUERY SYSTEM. Federal Aviation Administration, 1970. ED 038 154. AD700 021.

145. Falor, Ken: "Survey of program packages - Report generators and file management systems," MODERN DATA 3:8 (August 1970), 48-50.

146. Henderson, James W.; Rosenthal, Joseph A., eds.: LIBRARY CATALOGS: THEIR PRESERVATION AND MAINTENANCE BY PHOTOGRAPHIC AND AUTOMATED TECHNIQUES. (Cambridge, Mass., MIT Press, 1969), MIT Report no. 14.

147. Kilgour, Frederick G.: "Retrieval of single entries from a computerized library catalog file," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 20-24 October 1968. Proceedings, vol. 5. (New York, Greenwood, Pub. Corp., 1968), 133-136.

148. Krinos, J.: CONVERSION OF EXISTING LIBRARY CATALOGUES TO COMPUTER FILES, (Farmington, Conn., Hamilton Standard, 1968). In James W. Ramey, ed., FIFTH ANNUAL NATIONAL COLLOQUIUM ON INFORMATION RETRIEVAL, 3-4 May, 1968. 31-40.

149. Lesk, M. E.; Salton, G.: INTERACTIVE SEARCH AND RETRIEVAL METHODS USING AUTOMATIC INFORMATION DISPLAYS. (Montvale, New Jersey. AFIPS Press, 1969), 435-446.

150. Lipetz, Ben-Ami: "Influence of file activity, file size and probability of successful retrieval on efficiency of file structures," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 1-4 October 1969. Proceedings, vol. 6. (Westport, Conn., Greenwood Pub. Corp., 1969), 175-191.

151. Madnick, Stuart E.; Alsop, Joseph W: "A modular approach to file system design," In AFIPS CONFERENCE PROCEEDINGS, Vol. 34, 1969 Spring Joint Computer Conference. (Montvale, New Jersey. AFIPS Press 1969).

152. Nugent, William R.: "The mechanization of the filing rules for the dictionary catalogs of the Library of Congress," LIBRARY RESOURCES AND TECHNICAL SERVICES 11:2 (Spring 1967), 145-166.

153. Nugent, William R.: "Compression word coding techniques for information retrieval," JOURNAL OF LIBRARY AUTOMATION 1:4 (December 1968), 250-260.

154. Pietrzyk, Alfred; Lamberts, Frances; Freeman, Robert: FILE MANAGEMENT TECHNIQUES AND SYSTEMS WITH APPLICATIONS TO INFORMATION RETRIEVAL. A SELECTIVE BIBLIOGRAPHY. (Washington, D. C., Center for Applied Linguistics, 1968). PB 178 792.

155. Ruecking, Frederick H., Jr.: "Bibliographic retrieval from bibliographic input; the hypothesis and construction of a test," JOURNAL OF LIBRARY AUTOMATION 1:4 (December 1968), 227-238.

156. Stangl, Peter; Lipetz, Ben-Ami; Taylor, Katheryn E.: "Performance of Kilgour's truncation algorithm when applied to bibliographic retrieval from a library catalog," In North, Jeanne B., ed., American Society for Information Science. ANNUAL MEETING, 1-4 October 1969. Proceedings, vol. 6. (Westport, Conn., Greenwood Pub. Corp., 1969), 125-127.

157. Warheit, I. A.: "File organization of library records," JOURNAL OF LIBRARY AUTOMATION 2:1(March 1969), 20-30.

158. Welch, Noreen O.: A SURVEY OF FIVE ON-LINE RETRIEVAL SYSTEMS. (Washington, Mitre Corp., 1968). MTP-322.

GPO 903.763